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CASE REPORT

Extensive thrombosis (DVT/PE) with phlegmasia cerulea dolens/amputation and compartment syndrome with COVID-19: a case report

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ABSTRACT

Background: Coronavirus disease 2019 (COVID-19) is a novel coronavirus with a clinical presentation similar to that of common cold, including fever and cough. COVID-19 is known to be associated with thrombus formation. It was found to cause deep venous thrombosis (DVT), which in turn leads to a rare complication known as phlegmasia cerulean dolens (PCD).

Case Presentation: The present case was of a 62-year-old female suffering from COVID-19 who had no history of D-dimer's deep venous level. The patient developed DVT in her lower left limb. By radiographic and clinical examination, the patient was found to have PCD. The patient underwent fasciotomy for the treatment; however, myonecrosis was found during the operation. For this reason, the patient underwent amputation.

Conclusion: COVID-19 could cause PCD through DVT leading to amputation, if the treatment is delayed. Therefore, early assessment of thrombi in COVID-19 and urgent management could protect the patient from further complications and bad consequences.

Keywords: COVID-19, DVT, compartment syndrome, phlegmasia cerulea dolens, case report.

Introduction

Coronavirus disease 2019 (COVID-19) is a viral disease caused by the novel coronavirus; the novel virus causes pneumonia. Its symptoms appear similar to the common cold symptoms, including fever and dyspnea [1,2]. The formation of thrombi in patients with COVID-19 is increasing, especially among critically ill patients. These include the formation of deep vein thrombosis (DVT), stroke, and pulmonary embolism (PE). The higher risk of thrombotic formation among COVID-19 patients could be attributed to endothelial injury, hypercoagulable state, or blood stasis [3]. Phlegmasia cerulean dolens (PCD) is an uncommon, life-threatening complication of DVT, which is characterized by pain, swelling, and cyanosis of the extremities. This, in turn, leads to gangrene that results in an increased rate of amputation and mortality [4].

Case Presentation

The present case was a 62-year-old female. The patient was presented to an outside hospital suffering from cough, fever, and shortness of breath for 2 days. The patient was diagnosed with acute COVID-19 pneumonia. According to her medical history, the patient was suffering from diabetes mellitus and hypertension. The patient had no previous history of deep venous thrombosis (DVT) or hypercoagulable state. After 5 days, she suffered motor weakness and constant moderate pain in the left foot, the mid-shift, and thigh. The patient developed calf edema and discoloration in her left lower extremity. The woman underwent radiographic imaging; the doppler ultrasound showed the presence of an extensive left-sided DVT that was extended from down infra popliteal to the left external iliac vein. The patients' left external iliac vein was distended with the presence of an isoechoic thrombus. A further extension was found in the left great saphenous vein. Diffuse atherosclerotic change with

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multiple calcified and non-calcified atheroma was found. Also, there was a damped flow of the distal 5 cm of the anterior tibial artery with no detection in the dorsal pedis artery indicating acute ischemia on the top.

The patient was managed by heparin infusion; after 2 days of heparin infusion, the condition of the patient was worsened as she developed cyanosis in the affected limb. The foot of the affected left limb became more tensed cold compared to the other limb. She had a D-dimer level of 7.8 ng/ml, with normal immunoglobulin G, immunoglobulin M, immunoglobulin A, factor V, and factor VIII. The patient was then referred to the internal medicine department facility.

The examination of the patient showed that she was suffering basal bilateral crepitation, and had a blood pressure of 110/80 mmHg, a pulse rate of 115/min, a respiratory rate of 30/min, and blood oxygen saturation (SpO2) of 98%. The computed tomography of the patient's chest showed bilateral PE and moderate atherosclerotic change of thoracic aorta.

The patients' left limb was examined, and it was found that the left lower limb was cold, pale, impalpable pulse distally in the leg, weak motor power at the level of the ankle joint, with edema, and was tight with skin bullae affection (Figure 1). The patient was diagnosed with PCD with acute compartment syndrome.

The next day of admission to the internal medicine department, the patient underwent fasciotomy; during the operation, myonecrosis was found in the compartment musculature of her leg. The patient finally underwent an amputation above the left knee. After the surgery, she was on wound dressings and administration of anticoagulants.

Figure 1. *Left leg of the patient affected with edema and tight with skin bullae affection.*

Discussion

COVID-19 symptoms include cough, fever, dyspnea, oxygen desaturation, and chest pain; these symptoms were associated with the elevation in the D-dimer levels and pulmonary microangiopathy [5,6]. This is similar to the presented case; the patient was suffering from cough, fever, and shortness of breath; with an increased D-dimer level, the patient was diagnosed with COVID-19. Although the female had no history of DVT or a hypercoagulable state, the Doppler ultrasound revealed an extensive DVT in the left leg. The increase in D-dimer could explain extensive DVT, where the female had a high value of 7.8 ng/ml. The female was infused with heparin; however, her case worsened. Doppler ultrasound could reveal the occlusion in veins and arteries of the lower limb. The main finding is extensive thrombus in the superficial and deep venous system in the affected lower limb [4].

The presented case showed extensive DVT in her affected limb, with the damped flow and chronic ischemia. DVT could lead to arterial circulation impairment resulting in limb gangrene and ischemia. DVT could also lead to a complication known as PCD [4]. PCD symptoms include severe pain, cyanosis, and edema [7]. Also, extensive DVT of the major axial deep venous channels of the lower limb with relative sparing of collateral vein results in PCD [4]. The diagnosis of PCD could be made clinically [7]. By further examination of the case, the patient was found having a cold and pale left lower limb, with cyanosis, weak motor power, and edema. As the patient had extensive DVT and the symptoms of PCD, so the patient was diagnosed with PCD.

The management of complicated cases of PCD involves the urgent need to reduce the thrombus burden to prevent further episodes of PCD, such as ischemic necrosis leading to amputation [8]. In the presented case, the patient underwent fasciotomy; however, during the operation, there was myonecrosis noted in her leg, so the patient underwent amputation above the knee. There was a case report that discussed the association between COVID-19 and DVT [9]. Here, the COVID-19 patient developed DVT, which in turn evolved to PCD. Only one previous case reported the association between COVID-19 and PCD [10]. This indicates that COVID-19 could cause PCD through the DVT, and if the patient did not receive appropriate treatment, the patient could experience amputation. So, any patient with COVID-19 should be examined for any thrombi and urgent treatment should be administered to avoid bad consequences.

Conclusion

A case diagnosed with acute COVID-19 infection associated with hypercoagulopathy leading to DVT was presented. The DVT did not respond to heparin treatment

and developed PCD with acute compartment syndrome. Hence, COVID-19 could cause PCD through DVT if the patient is not managed urgently. The COVID-19 patient should be examined for any thrombi for early treatment to avoid severe complications, including PCD. It could be considered that PCD is a further complication of COVID-19. COVID-19 leads to PCD due to untreated hypercoagulopathy.

List of Abbreviations

DVT	Deep venous thrombosis
PCD	Phlegmasia cerulean dolens
PE	Pulmonary embolism

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this case report.

Funding

None.

Consent to participate

Informed consent was obtained from the participant.

Ethical approval

Ethical approval is not required at our institution for an anonymous case report.

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